

Questions and Answers

Levels I, II, and III

**Liquid Penetrant Testing
Method**

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Recommended Training References

Liquid Penetrant Testing Method

The following references were used in formulating the questions contained in this book.

- A.* McMaster, R.C., ed. *Nondestructive Testing Handbook*, first edition, Columbus, OH, American Society for Nondestructive Testing, Inc. 1959.
- B.* Tracy, Noel A., technical editor, Patrick O. Moore, editor, *Nondestructive Testing Handbook*, third edition: Volume 2, *Liquid Penetrant Testing*, Columbus, OH, American Society for Nondestructive Testing, Inc., 1999.
- C.* *Liquid Penetrant Testing: Classroom Training Handbook* (CT-6-2) and *Liquid Penetrant Testing Programmed Instruction Handbook* (PI-4-2), San Diego, CA, General Dynamics/Convair Division. 1978. (Now published by The American Society for Nondestructive Testing, Inc.)
- D.* *Metals Handbook*, eighth edition, *Nondestructive Inspection and Quality Control*, Volume 11, Metals Park, OH, American Society for Metals. 1976.

* Available from The American Society for Nondestructive Testing, Inc.

Each question found in this book is followed by letter(s) and page number(s) indicating the specific recommended reference where the answer may be found. For example:

28. The term used to define the tendency of certain liquids to penetrate into small openings such as cracks or fissures is:

- a. saturation
- b. capillary action
- c. blotting
- d. wetting agent

D.21

In this example, the letter “D” refers to Reference D in the list above and “21” is the specific page in Reference D where the answer to the question is located.

Reference Usage List

Reference A: Total = 83
Level I (70)
Level II (0)
Level III (13)

Reference B: Total = 84
Level I (19)
Level II (27)
Level III (38)

Reference C: Total = 9
Level I (4)
Level II (0)
Level III (5)

Reference D: Total = 69
Level I (22)
Level II (46)
Level III (1)

Level I Questions

Liquid Penetrant Testing Method

1. Which one of the following conditions will affect the rate and the extent a liquid penetrant will enter cracks, fissures and other small openings?

a. the hardness of the specimen being tested
b. the surface condition of the specimen being tested
c. the color of the penetrant
d. the conductivity of the specimen being tested

A.6-6
2. Which of the following is a commonly used classification for penetrant?

a. postemulsifiable penetrant
b. nonferrous penetrant
c. chemical etch penetrant
d. nonaqueous penetrant

A.6-2
3. A generally accepted method for removing excess nonwater washable penetrant is:

a. repeatedly dipping the test specimen in a cleaner
b. soaking the test specimen in hot detergent water
c. blowing the excess penetrant off the surface of the part with compressed air
d. wiping and cautiously cleaning the test specimen with a cleaner-dampened cloth

A.6-19
4. All of the following parts can be tested by the liquid penetrant method except:

a. an iron casting
b. an aluminum forging
c. a part made from a porous plastic material
d. a part made from a nonporous material

A.6-1
5. Which of the following discontinuities can be found by the penetrant test method?

a. a surface crack
b. a subsurface crack
c. an internal inclusion
d. none of the above

A.6-1
6. Which of the following is generally the more acceptable method for cleaning parts prior to penetrant testing?

a. sand blasting
b. wire brushing
c. grinding
d. vapor degreasing

A.6-6
7. All of the following methods are commonly used to clean parts prior to penetrant testing except:

a. vapor degreasing
b. liquid solvent
c. power wire brushing
d. alkaline cleaner

A.6-6
8. Cutting oils may be effectively removed from parts before penetrant testing by:

a. preheating
b. vapor degreasing
c. washing with water
d. all of the above

B.169
9. The most common type of contaminant in fluorescent penetrant fluid is:

a. metal filings
b. oil
c. detergents (from cleaning)
d. water

A.7-33

Liquid Penetrant Testing Method, Level I

10. Ultraviolet light, with a proper functioning filter in place, used for fluorescent penetrant inspection can cause permanent damage to:
- a. human tissues
 - b. human eyes
 - c. human blood cells
 - d. none of the above

A.7-35

11. All of the following basic inspection principles apply to the visible penetrant methods except:
- a. the penetrant must enter the discontinuity in order to form an indication
 - b. indications glow when illuminated with an ultraviolet light
 - c. a longer penetration time is required for smaller discontinuities
 - d. if the penetrant is washed out of the discontinuity, an indication will not be formed by that discontinuity

A.6-5

12. Subsurface discontinuities can be best detected by:
- a. the postemulsification penetrant method
 - b. the visible dye penetrant method
 - c. the fluorescent, water washable penetrant method
 - d. none of the above

A.6-1

13. Water washable penetrants may be applied by:
- a. brushing
 - b. spraying
 - c. dipping
 - d. all of the above

D.32

14. The first step in conducting a liquid penetrant test on a surface that has been painted is to:
- a. carefully apply the penetrant over the surface
 - b. completely remove the paint
 - c. thoroughly wash the surface with a detergent
 - d. wire brush the surface to roughen the smooth surface coating of paint

A.6-6

15. When using a postemulsification penetrant, it is necessary to apply the emulsifier:
- a. before applying the penetrant
 - b. after the water wash operation
 - c. after the dwell time has elapsed
 - d. after the development time has elapsed

A.6-9

16. When conducting a water washable liquid penetrant test, the wet developer is applied:
- a. immediately after the penetrant has been applied
 - b. immediately before the penetrant is applied
 - c. after removal of the penetrant
 - d. after removal of the emulsifier

D.33

17. The term used to describe the action of a particular developer in soaking up the penetrant in a discontinuity, so as to cause the maximum bleedout of the liquid penetrant for increased contrast and sensitivity, is known as:

- a. blotting
- b. capillary action
- c. concentration
- d. attraction

D.25

18. Using an ultraviolet light lamp with a cracked filter or without the filter in place can cause damage to human eyes because the lamp emits:

- a. black light
- b. ultraviolet light
- c. infrared light
- d. none of the above

A.7-17

19. The term used to define the period of time in which the test part is covered with penetrant is:
- a. waiting time
 - b. soak time (drain time)
 - c. penetration time (dwell time)
 - d. bleed in time

A.6-3

Sample Specification Answers
Liquid Penetrant Testing Method

- 1. d
- 2. d
- 3. d
- 4. c
- 5. b
- 6. c
- 7. c
- 8. c
- 9. a
- 10. c

8. When removing the excess penetrant: a. a solvent dampened cloth must be used b. a dry absorbent cloth must be used c. care must be taken to avoid removing penetrant from discontinuities d. all traces of excess penetrant must be removed Para. 7.2	20. Usually, the most desirable method of removing excess water washable penetrant after the dwell time is by using: a. a low pressure coarse water spray b. water and brush c. a solid stream of water d. water and clean rags A.6-7	25. Which of the following surface conditions could have a detrimental effect on a liquid penetrant test? a. a wet surface b. a rough weld c. an oily surface d. all of the above A.6-6
9. Final interpretation shall be made: a. after allowing a development period of 7 to 30 min b. from 7 to 30 min after developer has dried c. with an ultraviolet light d. after post cleaning Para. 7.5	21. When conducting a liquid penetrant test using a postemulsifiable visible dye penetrant, the generally accepted method for applying the wet developer is by: a. brushing b. swabbing c. dipping d. spraying A.6-17	26. Liquid penetrant testing is capable of detecting: a. subsurface intergranular stress corrosion cracking discontinuities b. discontinuities open to the surface c. subsurface discontinuities d. lack of fusion (subsurface) D.20
10. For penetrant application, the: a. ambient temperature shall be between 16 and 52 °C (60 and 125 °F) b. temperature of the penetrant shall be between 16 and 52 °C (60 and 125 °F) c. temperature of the part shall be between 60 and 125 °C (140 and 257 °F) d. minimum dwell time shall be 15 min Para. 7.1	22. Which of the following characteristics does not apply to liquid penetrant testing? a. this method can accurately measure the depth of a crack or discontinuity b. this method can be used for on-site testing of large parts c. this method can be used to find shallow surface discontinuities d. this method can be made more or less sensitive by using different penetrant materials A.8-2	27. Ultraviolet light equipment is required when penetrant testing by: a. the fluorescent penetrant method b. the visible dye penetrant method c. the nonfluorescent penetrant method d. all of the above A.6-24
	23. Which of the following discontinuities is most likely to be missed due to improper rinse techniques? a. a forging lap b. deep pitting c. shallow and broad discontinuities d. the rinse technique will not affect the detection of discontinuities A.6-5	28. The term used to define the tendency of certain liquids to penetrate into small openings such as cracks or fissures is: a. saturation b. capillary action c. blotting d. wetting agent D.21
	24. When conducting a fluorescent penetrant test, a commonly used technique for assuring that the excess penetrant has been removed prior to the application of a developer is to: a. blow compressed air over the surface b. chemically etch the surface c. blot the surface with absorbent paper d. scan the surface with an ultraviolet light A.6-7	29. Excess penetrant (all penetrant except that which is in discontinuities) is removed from the specimen: a. after the required penetrant dwell time has elapsed b. before the application of an emulsifier if a postemulsifier penetrant is used c. by means of a steam cleaner d. only when water washable penetrants are used D.21

Liquid Penetrant Testing Method, Level I

30. When using a postemulsifiable penetrant, the emulsifier time should be:

a. as long as the penetrant dwell time
b. half the penetrant dwell time
c. the same as the developer time
d. only as long as necessary to remove the interfering background

D.35
31. When an inspector is working in a darkened area, he/she should become adjusted to the dark before inspecting parts. The generally accepted minimum time period for becoming accustomed to the dark is:

a. 1 to 5 min
b. 5 to 10 min
c. 10 to 15 min
d. no waiting period is necessary

B.114
32. When applying penetrant by dipping, heating the penetrant prior to dipping:

a. will not increase the sensitivity of the test
b. will not increase the capillary action of the penetrant
c. will increase the stability of the penetrant
d. is not generally recommended

A.7-34
33. Liquid penetrant inspection cannot find:

a. surface porosity
b. surface cracks
c. an internal cavity
d. a surface forging lap

A.6-1
34. All of the following materials can be tested by the usual liquid penetrant tests except:

a. unglazed porous ceramic
b. titanium
c. high alloy steel
d. cast iron

A.6-1

35. Liquid penetrant testing can be used to detect:

a. discontinuities 1.6 mm (0.06 in.) below the surface
b. internal discontinuities
c. discontinuities open to the surface
d. all discontinuities

A.6-1
36. Which of the following are commonly accepted methods for applying penetrant?

a. dipping the part in penetrant (dipping)
b. pouring the penetrant over the test specimen (flowing)
c. spraying the penetrant on the test specimen (spraying)
d. all of the above

D.32
37. A solvent used to clean the surface of a test specimen must possess all of the following characteristics except that the:

a. cleaner must be capable of dissolving oils and greases commonly found on the surface
b. cleaner must not be flammable
c. cleaner must be free of excessive contaminants
d. cleaner must leave a minimal residue on the surface

B.171-172
38. Which of the statements below best states the danger of sandblasting (without subsequent chemical etching) for cleaning surfaces to be penetrant tested?

a. the discontinuities may be peened over and closed
b. oil contaminants might be sealed in the discontinuities
c. the sand used in the sandblasting operation may be forced into the discontinuity
d. the sandblasting operation may introduce discontinuities

A.8-5

Sample Specification Questions
Liquid Penetrant Testing Method

- Using the sample specification located on pages 40-41, answer the following questions. (References listed pertain to paragraphs in the sample specification.)

1. By this specification, lamination in excess of 1.6 mm (0.06 in.) is:

a. rejectable
b. acceptable
c. subject to evaluation
d. not considered

Para. 3.0
2. When inspecting austenitic stainless steel plates in accordance with this procedure, any indication is rejectable if it is larger than:

a. 1.6 mm (0.06 in.)
b. 2.4 mm (0.09 in.)
c. 3.6 mm (0.14 in.)
d. 3.2 mm (0.13 in.)

Para. 8.3
3. The maximum allowable dwell time for water washable penetrant in accordance with this procedure is:

a. 45 min
b. 10 min
c. 30 min
d. not defined

Para. 7.1
4. When using color contrast penetrants, inspections can be performed if the lighting is:

a. adequate to easily see all indications
b. at least equal to 100 lx
c. at least equal to 1076 lx
d. at least equal to 700 mW/cm²

Para. 6.0
5. The surface to be inspected:

a. must be as free of extraneous material as is practical
b. should be free of all extraneous material
c. is to be cleaned with organic solvents having a residual of halogen of less than one percent by weight
d. should be sandblasted to remove scale

Para. 4.0, 5.0
6. A liquid penetrant examination reveals 4 rounded indications which are aligned. The greatest distance between any two of them is 1.6 mm (0.06 in.). Their sizes as viewed from left to right are 1.6 mm (0.06 in.), 0.8 mm (0.03 in.), 2.4 mm (0.09 in.), and 1.6 mm (0.06 in.). No other indications are present.

a. this area is acceptable
b. this area is rejectable
c. there is not sufficient information given to determine acceptability
d. spacing does not matter

Para. 8.4
7. A linear indication is an indication where:

a. $W = 2L$
b. $L \geq W$
c. $L \geq 2W$
d. $L = 3W$

Para. 8.1

8.0 Rejection Criteria

- 8.1 All linear penetrant indications longer than 1.6 mm (0.06 in.). Linear is defined as an indication whose length is at least two times its width.
- 8.2 Four or more indications in a line, any one of which is separated from the adjacent indication by less than 1.6 mm (0.06 in.) or D, whichever is greater, where D is the major diameter of the larger of the adjacent indications.
- 8.3 Any single penetrant indication larger than 3 mm (0.13 in.).
- 8.4 Non-linear penetrant indications less than 0.8 mm (0.03 in.) may be disregarded.

9.0 Personnel Certification

All personnel performing liquid penetrant examination shall be qualified and certified in accordance with ASNT *Recommended Practice No. SNT-TC-1A*. Personnel performing the examination and determining acceptance or rejection shall be certified to Level II, Personnel performing cleaning and penetrant material application and removal shall be certified to at least Level I.

Liquid Penetrant Testing Method, Level I

- 39. The penetrant applied to the surface of a test specimen:
 - a. seeps into discontinuities
 - b. is absorbed by discontinuities
 - c. is drawn into discontinuities by capillary action
 - d. is drawn into discontinuities by gravityD.21
- 40. Which of the following statements concerning liquid penetrant testing is correct?
 - a. fluorescent penetrants will produce red against white discontinuity indications
 - b. nonfluorescent penetrants require the use of ultraviolet lights
 - c. fluorescent indications will be seen when exposed to ultraviolet light
 - d. nonfluorescent discontinuities glow in the dark for easy viewing and interpretationA.6-2
- 41. When removing excess penetrant from the surface of a test specimen:
 - a. the penetrant removal operation must not remove the penetrant from discontinuities
 - b. sufficient excess penetrant must be removed to eliminate an interfering background
 - c. the use of a solvent-dampened cloth is a common method of penetrant removal
 - d. all of the aboveD.23-24
- 42. The most widely accepted method for removing excessive water washable penetrant from the surface of a test specimen is by:
 - a. using a wet rag
 - b. using a water spray rinse
 - c. washing the part directly under water running from a tap
 - d. immersing the part in waterA.6-7
- 43. The final inspection of a test specimen for discontinuities should take place:
 - a. immediately after the developer has been applied
 - b. any time after the developer has been applied
 - c. after the developer has been on the test specimen for the proper development time
 - d. immediately after the rinse operationD.33
- 44. Which of the following is an advantage of visible dye penetrants over fluorescent penetrants?
 - a. visible dye penetrants do not require ultraviolet light
 - b. visible dye penetrants are more sensitive than fluorescent penetrants
 - c. visible dye penetrants are superior in penetrating characteristics
 - d. visible dye penetrants are not toxic while fluorescent penetrants are toxicD.31
- 45. The terms *dry*, *aqueous wet* and *nonaqueous wet* are used to describe three different types of:
 - a. emulsifiers
 - b. cleaners
 - c. developers
 - d. penetrantsD.26
- 46. Which of the following is not a generally accepted method for applying penetrants?
 - a. rubbing the penetrant over the surface
 - b. brushing the penetrant on the part
 - c. spraying the penetrant on the part
 - d. dipping the part in the penetrantA.6-2, 7, 13, 19
- 47. Which of the following is the most commonly used method for removing nonwater washable visible dye penetrant from the surface of a test specimen?
 - a. dipping in a solvent
 - b. spraying
 - c. hand wiping
 - d. blowingA.6-19
- 48. Which of the following is an acceptable method for applying wet developers?
 - a. application with a soft brush
 - b. application with a hand powder bulb
 - c. rubbing with a saturated cloth
 - d. spraying or dippingA.6-17, 15

Liquid Penetrant Testing Method, Level I

49. When using solvent removable penetrants, the excess penetrant may be removed by:

a. dipping the part in solvent
b. spraying the part with water and a solvent
c. rubbing the part with a wet rag
d. wiping the part with a rag or cloth that has been lightly moistened with solvent

A.6-19
50. While conducting a penetrant test, all of the following health precautions should be applied except:

a. keeping the work area clean
b. washing any penetrant from skin with soap and water as soon as possible
c. keeping penetrant off clothes
d. washing any excess penetrant from skin using gasoline

A.7-35
51. Which of the following surface contaminants cannot be removed by cleaning parts in a vapor degreaser?

a. grease
b. rust
c. heavy oil
d. soluble oil

A.6-6
52. Before conducting a liquid penetrant test, it is important to ensure that the surface of the part is free of:

a. oil or grease
b. acids or chromates
c. traces of water
d. all of the above

A.6-6
53. When performing a penetrant test using a postemulsification penetrant, which of the following is the most critical with respect to proper timing?

a. dwell time
b. developing time
c. emulsification time
d. drying time

A.6-12
54. Which of the following is the most likely result of an excessive emulsification time when penetrant testing with postemulsification penetrants?

a. a large number of nonrelevant indications could appear on the part
b. shallow discontinuity indications could be lost
c. excess penetrant could remain after the wash operation
d. the emulsifier could harden, preventing the developer from blotting the penetrant in discontinuities

A.8-8
55. In penetrant testing, developers should be able to perform all of the following functions except:

a. blotting penetrant from discontinuities
b. aiding in providing an image of a discontinuity
c. adding fluorescence to penetrants
d. helping control bleedout

A.6-5
56. Which of the following is the primary limitation of liquid penetrant testing?

a. penetrant testing cannot be used on ferromagnetic material
b. penetrant testing cannot locate shallow surface discontinuities
c. penetrant testing cannot be used on nonmetallic surfaces
d. penetrant testing cannot locate subsurface discontinuities

B.8
57. In penetrant testing, the time period from developer application to inspection is often referred to as the:

a. emulsification time
b. development time
c. dwell time
d. none of the above

A.6-15

Sample Specification
Liquid Penetrant Testing Method

- 1.0 Scope

This specification is to be used for the liquid penetrant examination of wrought plate material for discontinuities open to the surface. Where the words “shall” and “should” appear herein, the former is considered to be a mandatory requirement and the latter to be a recommendation.
- 2.0 Material

Austenitic stainless steel.
- 3.0 Extent of Examination

Both major plate surfaces. Plate edges shall not be liquid penetrant examined.
- 4.0 Approved Methods and Materials

Either color contrast or fluorescent penetrants may be used. The penetrants shall be solvent removable type and the developer shall be wet non-aqueous. Penetrants and developers must be compatible and from the same manufacturer. Penetrant materials shall be certified that the total halogen content does not exceed one percent by weight (excluding vehicle if spray cans are utilized).
- 5.0 Surface Preparation

As-rolled surfaces are satisfactory. The surfaces to be examined shall be thoroughly cleaned prior to examination using organic solvents. The organic solvents shall meet the halogen requirements specified for penetrant materials. Prior to the application of penetrants, the surface shall be dry and free of dirt, grease, lint, scale, or other extra extraneous matter that could obscure surface openings or otherwise interfere with the examination. Plates shall not be subjected to sand or shot blasting prior to liquid penetrant examination.
- 6.0 Test Environment and Lighting Conditions

For color contrast penetrants the test shall take place in an area well-lighted (the area should be at least 1076 lx [100 ftc]). For fluorescent
- penetrants, the test should take place in a darkened area. The black light intensity at the surface under examination shall be a minimum of 600 mW/cm². The black light shall be filtered ultraviolet radiation of wavelengths within the range of 330-390 nm. The bulb shall be allowed to warm up at least 5 min prior to use in the examination.
- 7.0 Procedure

7.1 Penetrant Application

The penetrant may be applied by dipping, brushing, or spraying. The surface temperature of the part shall be between 15 and 52 °C (60 and 125 °F). The dwell time shall be as recommended by the penetrant manufacturer but shall not be less than 10 min nor more than 45 min.

7.2 Penetrant Removal

Excess penetrant shall be removed by wiping with a cloth or absorbent paper. The cloth or paper may be moistened with solvent in order to remove all traces of penetrant; however, care shall be taken to avoid using excess solvent such that penetrant could be removed from discontinuities.

7.3 Drying

Sufficient time should be allowed to allow the surface of the plate to dry (solvent evaporation) before applying developer.

7.4 Developer Application

Solvent suspensions shall be applied by spraying unless restricted by health or safety, in which case application may be by brushing.

7.5 Examination

Final interpretation shall be made after allowing a development period of not less than 7 nor more than 30 min. If the entire surface area of the plate cannot be examined within the allotted time, only portions of the surface shall be examined at any one time.
- 6
- 39

58. Liquid penetrant testing is a nondestructive test that can be used for:

a. locating and evaluating all types of discontinuities in a test specimen

b. locating and determining the length, width, and depth of discontinuities in a test specimen

c. determining the tensile strength of a test specimen

d. locating discontinuities open to the surface

A.6-1
59. When conducting a penetrant test using fluorescent penetrant, ultraviolet light equipment is required to:

a. cause the penetrant to fluoresce

b. aid the normal capillary action characteristics of a penetrant

c. neutralize excess penetrant on the surface

d. decrease the surface tension of the part

A.6-2
60. The method used to remove excess visible dye penetrant from a test specimen is primarily determined by:

a. the surface roughness of the specimen

b. the type of material being tested

c. the length of penetration time

d. all of the above

A.6-19
61. Which of the following is a type of developer used in penetrant inspection?

a. dry

b. aqueous particulate

c. nonaqueous particulate

d. water soluble

e. all of the above

D.26
62. When penetrant testing parts, the temperature of the parts should be near room temperature. If the part is at a low temperature when tested, the:

a. penetrant may become viscous

b. penetrant may evaporate very rapidly

c. color intensity of the penetrant will decrease

d. penetrant will tend to adhere to the surface of the part

A.8-7
63. If a part to be penetrant tested is hot, the penetrant:

a. may become viscous

b. may reduce sensitivity to small defects

c. may lose some of its color brilliance

d. will show small discontinuities better

A.8-7
64. Penetrants may be classified or subdivided by the method used to remove excess penetrant. Which of the following is a proper classification in accordance with this statement?

a. nonsolvent removable

b. vapor degreased

c. brush removable

d. water washable

A.6-2
65. The problem with retesting a test specimen with fluorescent penetrants that has been previously tested using visible dye liquid penetrant is that:

a. the penetrant may form beads on the surface

b. the penetrant left in discontinuities may be misleading when the specimen is retested

c. the penetrant will lose a great deal of its color brilliance

d. residue can diminish or destroy fluorescent indication brightness

B.165
66. Which of the following conditions will decrease the life of an ultraviolet light bulb?

a. line voltage fluctuations

b. dust on the face of the bulb

c. changes in room temperature

d. all of the above

A.7-16
67. Which of the following statements does not apply to developers used during penetrant testing?

a. developers are normally highly fluorescent

b. developers often furnish a contrasting background during inspection

c. developers absorb or blot the penetrant that remains in discontinuities after the rinse operation has been completed

d. developers may be either wet or dry

A.6-2

85. Water washable penetrant is applied to a part by dipping. The part is then placed on a rack while the penetrant seeps into discontinuities. If the penetration time is too long, it will be difficult to rinse the penetrant from the part. If this happens, the normal rinsing properties can be restored by:
- a. chilling the part to a temperature of 4 °C (40 °F)
 - b. heating the part to a temperature of 54 °C (130 °F)
 - c. redipping the part
 - d. applying a wet developer before attempting to rinse the part
- A.6-76**
86. When drying parts during a penetrant test, the parts:
- a. are normally dried at room temperature
 - b. are normally dried by a circulating hot-air dryer
 - c. should be dried in an oven set at a temperature of 54 °C (130 °F)
 - d. should be dried by cool forced air
- D.32**
87. The contamination of a water washable penetrant with an excessive amount of water will:
- a. reduce the penetrating quality of the penetrant
 - b. adversely affect the washability of the penetrant
 - c. both a and b are correct
 - d. neither a nor b are correct
- A.7-34**
88. Which of the following penetrant methods is generally used for portable field inspections?
- a. the water washable fluorescent penetrant method
 - b. the postemulsification fluorescent penetrant method
 - c. the visible dye penetrant method
 - d. none of the above
- A.6-18**
89. When using a fluorescent penetrant, the actual inspection must be performed:
- a. in a brightly lighted room
 - b. with the part at a temperature between 10 and 79 °C (50 and 175 °F)
 - c. immediately after the developer has been applied
 - d. in a darkened area under an ultraviolet light
- A.6-17**
90. Which of the following penetrants can be used when inspection must take place under ordinary lighting conditions?
- a. visible dye penetrant
 - b. water washable fluorescent penetrant
 - c. postemulsification fluorescent penetrant
 - d. any of the above
- A.6-18**
91. All of the following materials can be effectively tested with liquid penetrant except:
- a. aluminum
 - b. unglazed ceramics
 - c. glass
 - d. magnesium
- A.6-1**
92. Which of the following is a disadvantage of using the liquid penetrant testing method?
- a. the liquid penetrant test method is adaptable to production inspection of small parts
 - b. liquid penetrant testing can locate fine cracks
 - c. the liquid penetrant test method is a relatively simple test method
 - d. the liquid penetrant test method is not effective at all temperatures
- A.7-34**
93. A good penetrant must do all of the following except:
- a. be able to readily penetrate very fine openings
 - b. evaporate very rapidly
 - c. be able to remain in relatively coarse openings
 - d. be easily removed from the surface after testing
- A.7-18**

56. Which of the following is a criterion for a good dryer?
- a. it has the ability to dry the surface slowly
 - b. it has the ability to heat the part to an optimum temperature in a minimum of time so that the part is both dry and warm as promptly as possible
 - c. it has the electrical heating elements so that there is a guarantee that no contaminants can be introduced into the inspection process
 - d. it is a warm air blast system
- B.204**
57. What are two very important properties that determine whether a liquid will have high penetrating ability?
- a. surface tension and viscosity
 - b. viscosity and cosine of contact angle
 - c. cosine of the contact angle and density
 - d. surface tension and cosine of the contact angle
- C.40**
58. Where precleaning is necessary and a residue free solvent is used, which of the following is observed?
- a. the solvents are not suitable for removing grease
 - b. the solvents are not suitable for removing oil
 - c. the solvents should never be used for removing grease and oils
 - d. the solvents are suitable for removing grease and oils, but are generally not adequate if solids are embedded in void areas
- B.170**
59. When utilizing the fluorescent postemulsifiable penetrant method and performing the rinse cycle, which of the following will prevent overrinsing?
- a. rinse before the penetrant is completely emulsified
 - b. rinse after the penetrant is completely emulsified
 - c. discontinue the rinse as soon as the surface penetrant is removed from the part
 - d. rinse only with water hotter than 43 °C (110 °F)
- B.51**

Liquid Penetrant Testing Method, Level III

47. For postemulsifiable penetrants, a good method for establishing emulsifying time is by:

a. experimentation
b. the water drop through test
c. the water tolerance test
d. using published book values

B.53
48. A newly mixed batch of wet developer should:

a. be checked by a hydrometer
b. be agitated for 30 to 40 min
c. have 0.03 to 0.04 L per 3.8 L (1 to 1.5 oz per 1 gal) of ammonia added to stabilize the mixture
d. stand for 4 to 5 h prior to use

A.7-29
49. The test used to measure the sensitivity of a penetrant to water contamination based on the amount of water is the:

a. water drop through test
b. hydrometer test
c. photofluorometer test
d. water tolerance test

B.109
50. When performing an evaluation of the fluorescent ability of a penetrant, the value that is normally sought is the:

a. amount of actual light emitted by indications
b. amount of ultraviolet light necessary to cause the material to fluoresce
c. relative amount of light emitted by the fluorescent material compared to other penetrants
d. relative amount of light emitted by the fluorescent material compared to the light emitted by the background

C.268-272
51. A method for evaluating quantitative values for the emitted light of fluorescent materials is the use of a:

a. fluorometer
b. filtermeter
c. refractometer
d. spectrometer

C.112
52. The ability of an indication to be seen can be assigned a value called the contrast ratio. This ratio is based on the amount of:

a. white light present as opposed to the amount of light absorbed by the dye
b. light reflected by the background as opposed to the amount of light absorbed by the dye
c. light absorbed by the background as opposed to the amount of light reflected by the dye
d. light reflected by the background as opposed to the amount of light reflected by the dye

B.59
53. The contrast ratio of a red dye penetrant to a white developer is normally about:

a. 100 to 1
b. 33 to 1
c. 10 to 1
d. 9 to 2

B.61
54. The test object and standard penetrant materials should be within a particular temperature range. One of the reasons an excessively cold penetrant is undesirable is that as the temperature becomes lower:

a. the viscosity decreases
b. the viscosity increases
c. fewer volatile materials will be lost
d. the dyes degrade

A.8-7
55. If the surface temperature of the test part is excessively hot, the:

a. viscosity of the penetrant may be too high
b. penetrant may lose fluorescent brightness as the dyes are degraded
c. surface tension of the penetrant increases
d. contact angle increases

A.8-7

Liquid Penetrant Testing Method, Level I

94. Which of the following is not a property of a developer used in liquid penetrant testing?

a. the material must be absorbent
b. the material must form a thin and uniform coating over a surface
c. the material must be fluorescent if used with fluorescent penetrants
d. the material must not contain ingredients harmful or toxic to the operator

D.25
95. Developer coatings of excessive thickness:

a. may obscure indications
b. may be beneficial while observing small indications for fluorescent penetrants
c. may be beneficial while observing small indications for visible penetrants
d. do not effect the inspection

B.55
96. Color contrast penetrants are commercially available in which of the following variations?

a. normal solvent clean type
b. water wash type
c. postemulsification type
d. all of the above

D.24
97. Which of the following could be a source of false indications on a test specimen?

a. residue from previous liquid penetrant testing
b. machining oil
c. scale, rust and corrosion
d. all of the above

B.162-163
98. Cleaning of the part prior to penetrant inspection is:

a. not required
b. important because if the part is not clean, the developer cannot be improperly applied
c. essential because surface contaminants may prevent penetrant from gaining access to discontinuities
d. required to eliminate possibility of showing nonrelevant indications

A.6-6
99. When using fluorescent water washable penetrant, adequate rinsing of the part is assured by:

a. timing of rinse cycle
b. scrubbing of part surface
c. rinsing under ultraviolet light
d. using high pressure air with water

A.6-7
100. What can happen if a part processed by visible dye penetrant inspection is reprocessed by the fluorescent penetrant method?

a. developer may remain on the surface causing background
b. most visible dyes diminish or destroy fluorescence
c. penetrants are not compatible
d. interpretation will be difficult

B.165
101. A suitable filter must be used at all times over an ultraviolet light bulb because:

a. too much white light will be present if the filter is not in place
b. the human eye may be damaged without it
c. the filter filters out undesired wave lengths
d. all of the above

B.231
102. A good commercial penetrant should have a:

a. low flash point
b. high flash point
c. medium flash point
d. flash point is not a factor to be considered

B.73
103. A material that is applied over the film of the penetrant on the surface of a part, mixes with the penetrant, and enables the penetrant to be washed off the surface is called:

a. an emulsifier
b. a penetrant
c. a developer
d. an isomer

B.37

Liquid Penetrant Testing Method, Level I

104. The time allowed for the penetrant to enter discontinuities that may be present is the: a. emulsification time b. application time c. dwell time d. drain time	B.42	110. What is the most universally used ultraviolet light? a. incandescent lamps b. metallic carbon arcs c. tubular <i>BL</i> fluorescent lamps d. enclosed mercury-vapor arc lamps	A.7-12
105. Which of the following penetrant systems is generally considered to be the most sensitive? a. water washable – visible dye b. solvent removable – visible dye c. water washable – fluorescent dye d. postemulsification – fluorescent dye	D.23	111. Which of the following processes would be most sensitive to detecting very fine defects? a. oil-and-whiting process b. water washable process c. postemulsification process d. water emulsifiable visible dye penetrant process	A.6-23
106. The best choice of a developer for use on a very smooth surface when using a fluorescent penetrant would be: a. dry – fluffy b. dry – regular c. wet d. none of the above	B.92	112. When using the postemulsification fluorescent process, which of the following methods cannot be used? a. dipping the part in the emulsifier b. spraying the part with emulsifier c. pouring emulsifier over the part d. brushing emulsifier on the part	A.6-11
107. The purpose of an emulsifier is to: a. combine with the penetrant to make the resultant mixture removable by a water rinse b. assist the blotting action of the developer c. increase the penetration of the penetrant into fine discontinuities d. eliminate false indications	C.3-12	113. Which of the following would be the most desirable center wavelength for the output of the light source used in fluorescent processes? a. 320 nm b. 365 nm c. 520 nm d. 565 nm	A.7-12
108. Developer assists in the detection of visible liquid penetrant indications by: a. providing a clean surface b. providing a contrasting background c. providing a dry surface d. emulsifying the penetrant	C.4-9	114. Bleedout of penetrant from a cold shut is an example of: a. a false indication b. a nonrelevant indication c. a true indication d. none of the above	C.6-1
109. Liquid penetrant examination can detect all of the following types of discontinuities except: a. a forging lap b. a seam c. a surface crack d. subsurface porosity	C.2-6		

Liquid Penetrant Testing Method, Level III

36. Porosity indications in ceramics would appear: a. more intense than porosity indications in metals b. essentially the same as porosity indications in metals c. less intense than porosity indications in metals d. as minute cracks	A.8-22	42. The forces generated by capillary attraction cause a liquid to rise spontaneously in a capillary tube. These forces are also involved in the: a. entry of a liquid into a crack b. solubility of a liquid c. flash point of a liquid d. chemical inertness of a liquid	B.84
37. When inspecting glass and looking for very fine cracks, the preferred method is: a. postemulsifiable fluorescent b. water washable fluorescent c. postemulsifiable color contrast d. electrified particle	C.146	43. Viscosity has a considerable effect on some of the practical aspects of the use of a penetrant. It is an important factor in the: a. solubility of contaminants b. washability of a penetrant c. degree of fluorescence emitted d. rate with which a penetrant will drain off a smooth surface	B.86
38. When inspecting a hard fired ceramic that is very porous, the best inspection method would be the: a. filtered particle method b. electrified particle method c. brittle enamel method d. emulsifiable color contrast method	B.327	44. One of the two most important properties of a good penetrant is wetting ability. Wetting ability is: a. measured by contact angle and is not related to surface tension b. a function of viscosity and increases as surface tension decreases c. measured by contact angle and decreases as surface tension increases d. measured by surface tension and increases as contact angle decreases	B.84
39. A partially welded forging lap would probably: a. give no indication b. appear as a very thin, continuous line c. appear as a broad, continuous line d. appear as an intermittent line	A.8-2	45. A penetrant that will spread over the surface of the test area in a smooth, even film despite a small amount of surface contamination is said to have: a. low viscosity b. high viscosity c. wetting ability d. low evaporation	A.7-18
40. A ragged line, of variable width and numerous branches on castings caused by a difference in cooling rates between thick and thinner sections, would most likely be an indication of: a. shrinkage b. cold shut c. hot tear d. lap	C.7-58	46. The sensitivity of two penetrants for crack detection is best compared by: a. using a hydrometer to measure specific gravity b. using cracked aluminum blocks c. measuring the contact angles in a wetting test d. the meniscus test	B.249
41. A deep crater crack will frequently appear as a: a. small tight crack b. rounded indication c. fine linear indication d. faint intermittent line	A.8-3, 8-12		

25. When a large number of parts are inspected using dry developer that is applied by dipping, the tank should be equipped with:

a. an exhaust system

b. an agitator

c. an electrostatic charger

d. a developer replenisher

B.56
26. Filters for ultraviolet lights effectively remove:

a. natural white light

b. radiation of a wavelength above 300 nm

c. visible light from the energy given off by the mercury arc

d. fluorescence from the penetrant

B.112
27. The use of 100 watt spot bulbs with a plain filter for color contrast penetrants produces:

a. a high intensity narrow beam

b. a large amount of light over a large area

c. does not have a high maximum intensity in any one area

d. is ideal for inspecting large parts

B.233
28. A good penetrant must be:

a. inert with respect to the materials being tested

b. highly viscous

c. highly volatile

d. an inorganic base liquid

B.40
29. Wetting ability is measured by the:

a. specific gravity

b. density

c. contact angle

d. surface tension

B.40, 84
30. Which of the following functions does a developer perform?

a. blots the penetrant by drawing it out of discontinuities

b. masks out nonrelevant indications

c. dries out the surface of the part

d. provides a noncontrasting background

B.138

31. When inspecting using fluorescent penetrant methods, an indication will appear as a:

a. soft white glow against a gray background

b. brilliant yellow green glow against a white background

c. brilliant yellow green glow against a deep violet blue background

d. bright yellow green glow against a black background

A.8-2
32. A visible dye indication will usually appear as a:

a. bright red glow against a white background

b. red color against a gray background

c. red color against a white background

d. red color against a glowing white background

A.8-2
33. If an indication reappears after the original developer has been removed and another coat is applied, the discontinuity:

a. contains a reservoir of penetrant

b. is probably shrinkage

c. is most likely porosity

d. is most likely a crack

A.8-4
34. If, upon proper reprocessing, a faint indication fails to reappear, what could be the cause?

a. it was probably a false indication

b. the area has been overcleaned

c. the indication is probably due to a small flaw

d. reprocessing has resealed the opening

A.8-4
35. A network of interconnecting jagged lines appearing in hard fired, unglazed ceramic products would be an indication of:

a. thermal shock

b. fatigue cracks

c. shrinkage cracks

d. grinding cracks

C.5-12

115. Liquid penetrants become sluggish at temperatures:

a. above 38 °C (100 °F)

b. between 10 and 38 °C (50 and 100 °F)

c. below 10 °C (50 °F)

d. below 21 °C (70 °F)

C.3-24
116. Why is it possible to flush a surface with a coarse water spray to which a water washable penetrant was applied, remove the excessive penetrant, and not remove the penetrant that is in the defects?

a. the liquid will not wash the penetrant from the defects because the penetrant has to be drawn out by the developer

b. the nature of a water washable penetrant is such that water will not dissolve the penetrant; it has to push the penetrant off the surface, which is why a spray is used

c. the water droplets are relatively large and will not enter most defect openings

d. a water spray should not be used; the penetrant should be removed by a cloth dampened with water

A.6-5

16. Residual acids and chromates are detrimental to the fluorescent processes because:

a. the fluorescent dyes may be decomposed, resulting in weak or faint test indications

b. acids and oxidizing agents react with the fluorescent dyes only in the presence of water

c. acids and oxidizing agents react with the fluorescent dyes only in the presence of emulsifiers which are contained in water wash penetrants

d. emulsifiers neutralize the effects of the acids and chromates

B.104
17. Due to the nature of penetrant material, most methods have which of the following adverse effects on operator health?

a. penetrants are a hazard due to their inorganic base

b. penetrant methods include materials which can cause dermatitis if proper precautions are not observed

c. penetrant materials contain hallucinogens that can cause a sense of drunkenness

d. modern penetrants have been improved to be virtually hazard free

B.72
18. Which of the following is an advantage of postemulsifiable methods over water washable methods?

a. the excess penetrant removal is accomplished by water spray

b. their sensitivity is easier to control

c. the overall test time is shortened

d. they usually exhibit higher sensitivity to tight cracks

B.37
19. When compared to other methods, which of the items below are disadvantages of water emulsifiable visible dye methods?

a. degree of sensitivity to acidity and alkalinity

b. portability

c. test time

d. requirements of ordinary light

A.6-23
20. The type of penetrant to be used on an investment casting should be:

a. water washable visible dye for maximum sensitivity and water washability

b. solvent removable because of size and shape

c. postemulsifiable fluorescent for maximum sensitivity and water washability

d. solvent removable for greater visibility

B.344
21. Which of the following techniques has been found to be effective for aiding penetration in certain instances in commercial application?

a. heating the part

b. vibration

c. vacuum and pressure

d. ultrasonic pumping

B.138
22. There is a variety of equipment available for precleaning parts prior to penetrant application. Of the following, the recommended method for removing the oil phases, if practical, is:

a. sand or grit blasters

b. solvent or chemical tanks

c. vapor degreasers

d. water detergent washing machines

B.169
23. If modular equipment has been obtained for a penetrant inspection system using fluorescent postemulsifiable penetrant and wet developer, the dryer should be placed:

a. before the emulsifier tank

b. after the developer tank

c. before the developer tank

d. after the wash unit

B.43
24. In a modular equipment system using a water washable fluorescent penetrant and dry developer, ultraviolet light should be available:

a. at the penetrant station

b. at the wash station

c. at the developer station

d. after the oven cycle

B.49

8. The sensitivity of wet developers can be seriously impaired:

a. when the developer temperature is greater than the ambient temperature

b. when the thickness of the coating becomes too heavy

c. if the corrosion inhibitors are added to the developer

d. if the surface of the part is polished

B.55
9. When is a nonaqueous wet developer generally preferred?

a. when the dryer oven temperature is above 121 °C (250 °F)

b. when it is essential to use the most sensitive developers

c. when using a fluorescent penetrant on an as-cast surface

d. when using a fluorescent penetrant on a wire brushed weld

B.93
10. The best method of drying after the application of a wet developer is normally:

a. blotting the surface gently with absorptive paper toweling

b. allowing the part to dry slowly at or slightly below the ambient temperature

c. rapid drying with a normal room temperature air blast

d. drying with circulating air at a maximum of 71 °C (160 °F).

B.384
11. Removal of residual penetrant or developer materials by a suitable postcleaning technique is advantageous in which of the following cases?

a. where it could interfere with subsequent processes or with service

b. where it could provide a contrasting background

c. where it could assist in the emulsification of the penetrant bleedout

d. where it could assist in the lattice structure breakdown

B.178

12. Postcleaning is particularly important where residual penetrant or developer materials may combine with other materials in service to produce:

a. corrosive action

b. a contrasting background

c. false penetrant indications

d. proper surface tension

B.178
13. Postcleaning should be performed:

a. as soon as possible if the material is susceptible to corrosion

b. after several hours because the drier the materials are, the easier they can be wiped off

c. with the part warm to enhance the solubility of penetrant material

d. with the part chilled to cause the materials to lose their cohesion

B.178
14. When using postemulsifiable fluorescent penetrant on small parts where sulphur or chlorine residue is deemed harmful:

a. low sulphur and low chlorine content penetrant materials should be used and the part should be postcleaned by solvent wipe

b. fluorescent materials should be used and the part should be detergent-washed

c. low sulphur and low chlorine penetrant materials should be used and the part should be postcleaned in an automatic detergent wash

d. color contrast should be used so that any residue can be readily seen and removed

B.41
15. *Ocular fluorescence* should be considered when arranging ultraviolet lights for testing, because direct or reflected ultraviolet light shining into the inspector's eyes:

a. could cause tissue damage

b. is harmless and of no consequence

c. even though temporary, can become extremely annoying and may impair inspector effectiveness

d. even though annoying, it will not impair inspector effectiveness

B.79

Level I Answers

Liquid Penetrant Testing Method

- | | | | |
|-------|-------|-------|--------|
| 1. b | 31. a | 61. e | 91. b |
| 2. a | 32. d | 62. a | 92. d |
| 3. d | 33. c | 63. d | 93. b |
| 4. c | 34. a | 64. d | 94. c |
| 5. a | 35. c | 65. d | 95. d |
| 6. d | 36. d | 66. a | 96. d |
| 7. c | 37. b | 67. a | 97. d |
| 8. b | 38. a | 68. c | 98. c |
| 9. d | 39. c | 69. d | 99. c |
| 10. d | 40. c | 70. b | 100. b |
| 11. b | 41. d | 71. b | 101. d |
| 12. d | 42. b | 72. a | 102. b |
| 13. d | 43. c | 73. c | 103. a |
| 14. b | 44. a | 74. a | 104. c |
| 15. c | 45. c | 75. c | 105. d |
| 16. c | 46. a | 76. b | 106. a |
| 17. a | 47. c | 77. d | 107. a |
| 18. b | 48. d | 78. c | 108. b |
| 19. c | 49. d | 79. a | 109. d |
| 20. a | 50. d | 80. d | 110. d |
| 21. d | 51. b | 81. c | 111. c |
| 22. a | 52. d | 82. b | 112. d |
| 23. c | 53. c | 83. d | 113. b |
| 24. d | 54. b | 84. a | 114. c |
| 25. d | 55. c | 85. c | 115. c |
| 26. b | 56. d | 86. b | 116. c |
| 27. a | 57. b | 87. c | |
| 28. b | 58. d | 88. c | |
| 29. a | 59. a | 89. d | |
| 30. d | 60. a | 90. a | |

Level III Questions
Liquid Penetrant Testing Method

1.

Chemical cleaners are often used for very dirty, greasy parts. If used:

a. the surface must be subsequently cleaned with a solvent cleaner
b. the surface must be thoroughly rinsed free of any residue
c. heat must be used to ensure the removal of any detergents from surface openings
d. the surfaces must be subsequently cleaned with a volatile solvent cleaner

B.165

2.

Generally, vapor degreasing is considered to be one of the best methods of preparing a part for liquid penetrant inspection because:

a. it totally removes all surface contaminants
b. the solvent vapor removes all petroleum based materials
c. the method is easily adapted to virtually any size of the part
d. the solvent vapor removes all inorganic soils

A.6-6

3.

When penetrant is applied to parts by dipping, the parts should be:

a. left in the tank during the entire dwell time
b. set aside until the dwell time is up
c. placed on a rack designed to return any excess drainage to the dipping station
d. placed in the alkaline solvent rinse tank immediately

D.29

4.

With all other factors the same when removing penetrant from the surface by spray water wash, penetrant in a crack would be harder to remove if it has:

a. low viscosity
b. high viscosity
c. medium viscosity
d. viscosity is not important

B.85
5.

The most desirable objectives governing the cleaning operations when removing surface penetrant are to remove:

a. little penetrant from defects and leave a minimal of residual penetrant remaining on the surface
b. little penetrant from a defect and leave no residual penetrant remaining on the surface
c. no penetrant from defects and leave a minimal of residual penetrant on the part surface
d. no penetrant from defects and leave no residual penetrant on the part surface

B.48

6.

The best method of removing the excess water washable penetrant is to:

a. immediately immerse the part in the water rinse tank
b. use water running directly from a tap
c. boil in hot water or steam spray
d. use a hose and nozzle with a coarse spray

B.42

7.

When removing excess postemulsifiable penetrant in a production situation involving relatively large irregularly shaped parts, you may use a:

a. coarsel spray
b. strong water blast
c. commercial solvent
d. hot water immersion

B.42

Level II Questions
Liquid Penetrant Testing Method

1.

Which of the following physical properties, more than any other, determines what makes a material a good penetrant?

a. viscosity
b. surface tension
c. wetting ability
d. no one single property determines if a material will or will not be a good penetrant

B.40, 84-86
2.

The speed with which a penetrant penetrates a surface flaw is influenced to the greatest extent by which of the following properties?

a. density
b. surface tension and wettability
c. viscosity
d. capillary action

B.84
3.

Which of the statements concerning the operation of the ultraviolet light bulbs of the mercury arc type is false?

a. the bulb takes about 5 min to warm up to its full output when first turned on
b. the lamp may go out if the line voltage drops below 90 V
c. line voltage variations above 120 V will have little or no effect on the bulb
d. if for any reason the arc is extinguished, the bulb will not immediately respond if the lamp is turned on right after it has been turned off

B.237-238
4.

Which of the items listed below is a disadvantage of using the liquid penetrant test method?

a. the method cannot find discontinuities that are not opened to the surface
b. the method is simple in principle and relatively easy to understand
c. the method is essentially simple in application
d. there are few limitations on the size and shape of the article that can be treated by this method.

B.8
5.

Which of the statements below applies to the liquid penetrant method of testing?

a. the penetrant test method is less flexible than the eddy current test method
b. the penetrant test method is less reliable than the magnetic particle method for finding surface defects in ferromagnetic materials
c. the penetrant test method will not detect fatigue cracks
d. the penetrant test method is more reliable than radiographic testing when attempting to detect minute surface discontinuities

B.8
6.

Which of the following types of discontinuities cannot be detected by the liquid penetrant test method?

a. surface laminations
b. internal forging bursts
c. surface cracks
d. surface laps

B.8

7. Which of the following types of discontinuities could be classified as a primary processing discontinuity often found in cast material?

a. fatigue crack
b. stress corrosion crack
c. porosity
d. lack of penetration

B.128
8. Which of the following discontinuities could be classified as a finishing processing discontinuity?

a. fatigue crack
b. stress corrosion crack
c. lamination
d. heat treat crack

B.127
9. Which of the following discontinuities could be classified as a service induced discontinuity?

a. fatigue crack
b. porosity
c. machining tear
d. lap

B.127
10. Which of the test part characteristics listed below are normally considered before the specific liquid penetrant test method is selected?

a. the kind and size of discontinuities most likely to occur
b. the intended application for the part
c. the surface finish of the part
d. all of the above

B.10
11. Which of the following foreign matter might block the openings of discontinuities if the surface of a test specimen is not properly cleaned?

a. paint
b. scale
c. core and mold material
d. all of the above

D.31
12. All of the following methods are recommended to remove grease from the surface of a penetrant test specimen except:

a. vapor degreasing
b. alkaline cleaning
c. cleaning with solvent type material
d. hot water rinsing

B.170
13. The penetrant indication for a cold shut on the surface of a casting will be a:

a. dotted or smooth continuous line
b. cluster of small indications
c. rough deep indication
d. large bulbous indication

D.41
14. The penetrant indication of a forging lap will normally be a:

a. round or nearly round indication
b. cluster of indications
c. continuous line
d. dotted line

B.129-130
15. When conducting a penetrant test, spherical indications on the surface of a part could be indicative of:

a. fatigue cracks
b. porosity
c. weld laps
d. hot tears

D.41
16. Penetrant developer is commonly available in all of the following forms except:

a. dry developer
b. nonaqueous developer
c. wet developer
d. high viscosity developer

D.25

Level II Answers
Liquid Penetrant Testing Method

1. d

2. d

3. c

4. a

5. d

6. b

7. c

8. d

9. a

10. d

11. d

12. d

13. a

14. c

15. b

16. d

17. d

18. c

19. b
20. c

21. a

22. a

23. c

24. d

25. c

26. a

27. d

28. c

29. d

30. d

31. c

32. d

33. b

34. a

35. d

36. c

37. a

38. d
39. b

40. d

41. b

42. c

43. a

44. d

45. b

46. b

47. b

48. d

49. d

50. b

51. c

52. b

53. c

54. d

55. e

56. b

57. d
58. c

59. b

60. a

61. a

62. d

63. b

64. c

65. b

66. c

67. a

68. a

69. d

70. d

71. b

72. d

17. Which of the following is a possible cause for false penetrant indications?

a. excessive washing
b. inadequate application of developers
c. penetrant or part too cold during penetration time
d. lint or dirt

B.151-152
18. Developer assists in the detection of penetrants retained in discontinuities by aiding the:

a. postcleaning process
b. emulsification process
c. bleedout process
d. drying process

D.39
19. Developer assists in the detection of the visible dye penetrant test indications by:

a. providing a clean surface
b. providing a contrasting background
c. providing a dry surface
d. emulsifying the penetrant bleedout

D.39
20. When using postemulsification penetrants, difficulties incurred during the washing operation can be overcome by:

a. reapplying a coating of emulsifier
b. increasing the water pressure used during the washing operation
c. completely reprocessing the part from surface preparation on and by using a longer emulsifier time, if allowed
d. dipping the part in boiling water

B.52, 53
21. Which of the following methods for applying nonaqueous developer is normally considered the most effective?

a. spraying
b. swabbing
c. brushing
d. dipping

D.27
22. Of the methods listed below, the most effective means of precleaning a test item to remove organic contaminants such as grease prior to a penetrant test is:

a. vapor degreasing
b. detergent cleaning
c. hot water rinse
d. solvent wiping

B.170
23. Fluorescent materials used in fluorescent penetrants respond most actively to radiant energy with a wavelength of approximately:

a. 700 nm
b. 250 kV
c. 365 nm
d. 1 klx (100 ftc)

B.36, 77
24. When performing a liquid penetrant test using solvent removable visible dye penetrant, there are several ways to remove excess penetrant from the surface of the part. Which of the methods listed below is generally regarded as most suitable for giving accurate test results?

a. squirting solvent over the surface with no more than 276 kPa (40 psi) pressure
b. wiping with a soaking wet cloth, then wiping with a dry cloth
c. wiping with a solvent dampened cloth, then wiping with dry cloths
d. wiping with dry paper wipes, then wiping with a solvent dampened cloth, and finally wiping with dry cloth

B.66
25. Emulsifier time:

a. is important but not normally critical
b. is the time needed to rinse the emulsifier and excess penetrant from the surface
c. is extremely important and will greatly affect test results
d. should be as long as economically practical

B.51

Liquid Penetrant Testing Method, Level II

44. Which of the following contaminants could affect the sensitivity of a penetrant?

a. acid
b. water
c. salts
d. all of the above

D.40
45. Which of the following is a discontinuity that might be found in a forging?

a. shrinkage cracks
b. laps
c. cold shuts
d. insufficient penetration

D.41
46. Which of the following is a discontinuity that might be found in rolled plate stock?

a. shrinkage cracks
b. inclusions
c. forging laps
d. blow holes

D.41
47. Which of the following is an advantage of fluorescent penetrants over visible type penetrants?

a. the inspection can be carried out in a well lighted area
b. small indications are more easily seen
c. they can be used where contact with water is objectionable
d. they are less sensitive to contamination of discontinuities

D.24
48. Which of the following is an advantage of visible dye penetrants over fluorescent penetrants?

a. small indications are more easily seen
b. they can be used on anodized and chromate surfaces
c. they make less background on rough surfaces
d. no special lighting is required

D.24
49. Which of the following is an advantage of solvent wipe methods over water washing?

a. no special lighting is necessary during inspection
b. they provide a quicker penetration of small openings
c. small indications are more easily seen
d. they can easily be carried out in the field and to remote areas

D.24
50. The tendency of a liquid penetrant to enter a discontinuity is primarily related to the:

a. viscosity of the penetrant
b. capillary forces
c. chemical inertness of the penetrant
d. specific gravity of the penetrant

D.21-22
51. The emulsifier is used:

a. to wash the penetrant out of discontinuities
b. to aid in washing off the surface of parts when using either the water or oil soluble penetrants
c. to emulsify the oil soluble penetrant, thereby making it water washable
d. to preclean parts before applying penetrant

D.25
52. The prime purpose of the ultraviolet light for fluorescent penetrant inspection is to:

a. magnify indications
b. make the indications visible
c. develop indications
d. speed up inspection

D.24
53. Why is it advisable to have an ultraviolet light installed at the wash station?

a. so inspection can be done without drying parts
b. to speed the bleeding of penetrant out of defects
c. to check the effectiveness of the wash cycle
d. to determine if parts have been covered with penetrant

D.29

Liquid Penetrant Testing Method, Level II

54. Developing powder should always be:

a. highly fluorescent
b. applied wet
c. colorless
d. evenly applied

D.33
55. When viewing parts, fluorescent background may indicate:

a. poor washing
b. insufficient emulsifying time (postemulsification method)
c. porous material and coating
d. improper cleaning before penetrant cycle
e. all of the above

D.32-33
56. In the absence of a written acceptance criteria, rejection or acceptance of parts should be based on the:

a. inspector's education
b. design of the part and its intended application
c. appropriate penetrant standard
d. selection of the penetrant

D.41-42
57. When improper processing causes inspection difficulties, what should the inspector do?

a. swab parts with a solvent
b. use a correct bleedback procedure
c. erase nonrelevant fluorescence
d. reprocess the part

D.41-42
58. Which of the following is most likely to render the postemulsification test ineffective?

a. the penetrant time is too long
b. the developing time is too long
c. the emulsifying time is too long
d. none of the above

D.28-32
59. Dry developer should be applied:

a. so that a heavy coat of developer covers all surfaces
b. so that a light dusting covers all surfaces to be inspected
c. with a dry paint brush
d. by dipping

D.26
60. Which factor would apply in determining the dwell time required for the penetrant to be effective?

a. type of discontinuity sought
b. shape of part
c. size of part
d. surface roughness

D.26-32
61. The part is an aluminum forging. Description — the indication is sharp, halfmoon shaped, not deep. It is called:

a. a lap
b. center line porosity
c. a heat treat crack
d. a false indication

D.41
62. The part is a 13 mm (0.5 in.) thick aluminum plate with a V weld. Description — the indication appears in an area that is somewhat dish shaped. The indication extends out from the center in a spoke formation. The indication is:

a. shrinkage
b. nonrelevant
c. a quench crack
d. a crater crack

D.41